Study shows depleted fish stocks can come back from the brink

April 18 2013

Olaf Jensen, assistant professor of marine science

(Phys.org) —Nature is a lot more resilient than we sometimes think. A study by Rutgers marine scientists published recently in *Science* shows that species of fish that have been overfished for decades can often be brought back more easily than expected once fisheries managers put limits on the exploitation.

It turns out, in fact, that the resilience – the ability to recover from overfishing – of a fish stock is enhanced, not hurt, even if it has been moderately overexploited for decades, offering the possibility of swift recovery if sensible catch limits are placed on it. Philipp Neubauer, a

postdoctoral scholar, and Olaf Jensen, an assistant professor of marine and coastal sciences, say the key is in the adaptation of fish to over-fishing. A fish stock is over-fished if its numbers fall below half the level needed to sustain maximum harvest.

This is good news because scientists had thought overfishing over a long time might compromise the ability of stocks to rebound to healthy levels. A species overfished for decades, they believed, would be harder to bring back because so many of its largest and oldest members, those that contribute most to reproduction, are caught in fishing nets. However, the opposite seemed the case, and Neubauer and Jensen hypothesize that many overfished species have adapted to being overfished and mature at an earlier age, allowing them to recover fairly quickly if fisheries managers restrict catches and give them time to catch up.

"Recovery of overexploited marine populations would be a 'win-win' for fisheries and conservation, easing pressure on wild populations and associated ecosystems, and ultimately enhancing catches, revenues and food security," Neubauer and Jensen wrote.

Neubauer was among the scientists who thought that decades of overfishing would lead to slow recovery once fishing was reduced. "My hypothesis, based on prior studies, was that marine stocks that had been overexploited for a long time would have a harder time coming back," Neubauer said. "So this was a bit of a surprise."

Neubauer, Jensen and their co-authors, Jeffrey Hutchings of Dalhousie University in Nova Scotia and Julia Baum of the University of Victoria in British Columbia, examined 153 fish and invertebrate stocks around the world that had declined to less than 50 percent of their maximum sustainable yield. They used all available data from fisheries managers from all over the world. "We actually used a statistical method borrowed from medicine, called survival analysis," Neubauer said. "What medical

researchers do is look at how long it takes, under a particular treatment, to recover from a disease. We looked at fish stocks as if they were patients undergoing treatment and examined the data to determine how long it would take each stock to recover."

The bad news is that species that have been intensely over-exploited for a brief time have a much harder time coming back. The same thing may be true for fish that reproduce slowly and have been severely overfished, such as Atlantic halibut. The challenge for fisheries managers, Jensen and Neubauer said, is to recognize over-exploitation early and put effective limits on the catch. Summer flounder in the U.S. mid-Atlantic region, for example, have bounced back, thanks largely to stricter limits on fishing.

"Nature is not as fragile as we might suppose," Jensen said. "Just because a fish stock has been overexploited for a long time doesn't mean we should give up on it."

More information: www.sciencemag.org/content/340/6130/347.full

Provided by Rutgers University